

# **NOTIFICATION OF ADDENDUM**

## **ADDENDUM NO. 2**

**DATED 1/26/2009**

<b>Control</b>	<b>6187-24-001</b>
<b>Project</b>	<b>RMC - 618724001</b>
<b>Highway</b>	<b>SH0199</b>
<b>County</b>	<b>TARRANT</b>

Ladies/Gentlemen:

Attached please find an addendum on the above captioned project. Included in the attachment is an addendum notification which details the changes and the respective proposal pages which were added and/or changed.

Except for new bid insert pages, it is unnecessary to return any of the pages attached.

Bid insert pages must be returned with the bid proposal submitted to the Department, unless your firm is submitting a bid using a computer print out. The computer print out must be changed to reflect the new bid item information.

Contractors and material suppliers, etc. who have previously been furnished informational proposals are not being furnished a copy of the addendum. If you have a subcontractor on the above project, please advise them of this addendum. Acknowledgment of this addendum is not requested if your company has been issued a proposal stamped "This Proposal Issued for Informational Purposes."

You are required to acknowledge receipt of this addendum on the Addendum Acknowledgement form contained in your bid proposal by placing a mark in the box next to the respective addendum.

Failure to Acknowledge receipt of this addendum in your bid proposal will result in your bid not being read.

SUBJECT: PLANS AND PROPOSAL ADDENDUMS

PROJECT: RMC - 618724001

CONTROL: 6187-24-001

COUNTY: TARRANT

LETTING: 01/27/2009

REFERENCE NO: 0126

**PROPOSAL ADDENDUMS**

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- ☐ PROPOSAL COVER
- ☐ BID INSERTS (SH. NO.: )
- X GENERAL NOTES (SH. NO.: CHANGE IN ON SHEET 2A )
- X SPEC LIST (SH. NO.: ADDED SPEC 4191 AS A REFERENCE TO ITEM 788 )
- ☐ SPECIAL PROVISIONS:
- ☐ ADDED:
- ☐ DELETED:
- X SPECIAL SPECIFICATIONS:
- ☐ ADDED: 4191
- ☐ DELETED: 6141
- ☐ OTHER:

DESCRIPTION OF ABOVE CHANGES  
(INCLUDING PLANS SHEET CHANGES)

THIS ADDENDUM WILL REMOVE SPECIAL SPEC 6141 FROM THIS PROJECT AND ADD SPECIAL SPECIFICATION 4191 "CARBON FIBER REINFORCED POLYMER (CFRP) FOR STRENGTHENING CONCRETE STRUCTURE MEMBERS" AS A REFERENCE TO ITEM 788. GENRAL NOTES SHEET 2A WAS NOT CORRECTED IN THE FIRST ADDENDUM BUT WILL BE IN THIS ADDENDUM.

# Error

File not found. See job completion status file.

CONTROL : 6187-24-001  
PROJECT : RMC - 618724001  
HIGHWAY : SH0199  
COUNTY : TARRANT

TEXAS DEPARTMENT OF TRANSPORTATION

**GOVERNING SPECIFICATIONS AND SPECIAL PROVISIONS**

ALL SPECIFICATIONS AND SPECIAL PROVISIONS APPLICABLE TO THIS PROJECT  
ARE IDENTIFIED AS FOLLOWS:

STANDARD SPECIFICATIONS: ADOPTED BY THE TEXAS DEPARTMENT OF  
----- TRANSPORTATION JUNE 1, 2004.  
STANDARD SPECIFICATIONS ARE INCORPORATED  
INTO THE CONTRACT BY REFERENCE.

ITEMS 1 TO 9 INCL., GENERAL REQUIREMENTS AND COVENANTS  
ITEM 422 REINFORCED CONCRETE SLAB (420) (421) <424> <426> <430> (440)  
ITEM 425 PRECAST PRESTRESSED CONCRETE STRUCTURAL MEMBERS (420)  
(421) (424) (426) (427) (434) (440) <442>  
ITEM 452 REMOVING RAILING (420)  
ITEM 496 REMOVING STRUCTURES <430>  
ITEM 500 MOBILIZATION  
ITEM 502 BARRICADES, SIGNS, AND TRAFFIC HANDLING  
ITEM 506 TEMPORARY EROSION, SEDIMENTATION, AND ENVIRONMENTAL  
CONTROLS (432) (556)  
ITEM 788 CONCRETE BEAM REPAIR (426) (427) (429) (441) (442) (780) <4191>

SPECIAL PROVISIONS: SPECIAL PROVISIONS WILL GOVERN AND TAKE  
----- PRECEDENCE OVER THE SPECIFICATIONS ENUMERATED  
HEREON WHEREVER IN CONFLICT THEREWITH.

SPECIAL PROVISION "SCHEDULE OF LIQUIDATED DAMAGES" (000--1002)  
SPECIAL PROVISION "DEPARTMENT DIVISION MAILING AND PHYSICAL ADDRESS"  
(000---011)  
SPECIAL PROVISION TO ITEM 1 (001---005)  
SPECIAL PROVISION TO ITEM 2 (002---013)  
SPECIAL PROVISION TO ITEM 3 (003---023)  
SPECIAL PROVISION TO ITEM 4 (004---012)  
SPECIAL PROVISION TO ITEM 5 (005---004)  
SPECIAL PROVISION TO ITEM 6 (006---030)  
SPECIAL PROVISIONS TO ITEM 7 (007---213) (007---445)  
SPECIAL PROVISIONS TO ITEM 9 (009---012) (009---015)  
SPECIAL PROVISION TO ITEM 420 (420---002)

SPECIAL PROVISION	TO ITEM	421	(421---031)
SPECIAL PROVISION	TO ITEM	424	(424---001)
SPECIAL PROVISION	TO ITEM	440	(440---001)
SPECIAL PROVISION	TO ITEM	442	(442---005)
SPECIAL PROVISION	TO ITEM	500	(500---005)
SPECIAL PROVISION	TO ITEM	502	(502---033)
SPECIAL PROVISION	TO ITEM	506	(506---010)

SPECIAL SPECIFICATIONS:

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ITEM 4191 CARBON FIBER REINFORCED POLYMER (CFRP) FOR STRENGTHENING  
 CONCRETE STRUCTURE MEMBERS  
 ITEM 6834 PORTABLE CHANGEABLE MESSAGE SIGN <502>

GENERAL: THE ABOVE-LISTED SPECIFICATION ITEMS ARE THOSE UNDER WHICH  
 ----- PAYMENT IS TO BE MADE. THESE, TOGETHER WITH SUCH OTHER  
 PERTINENT ITEMS, IF ANY, AS MAY BE REFERRED TO IN THE ABOVE-  
 LISTED SPECIFICATION ITEMS, AND INCLUDING THE SPECIAL  
 PROVISIONS LISTED ABOVE, CONSTITUTE THE COMPLETE SPECIFI-  
 CATIONS FOR THIS PROJECT.

## SPECIAL SPECIFICATION

**4191**

### **Carbon Fiber Reinforced Polymer (CFRP) for Strengthening Concrete Structure Members**

- 1. Description.** Furnish and install a carbon fiber reinforced polymer (CFRP) system for strengthening concrete structure members.
- 2. Materials.** Furnish only new materials. Provide unidirectional high-strength carbon fiber fabric, fully saturated with compatible epoxy resin per manufacturer's recommendations, to form a CFRP system. Properties of the carbon fibers in the CFRP must meet or exceed the following requirements:

**Table 1**  
**CFRP Carbon Fiber Property Requirements**

<b>Property</b>	<b>Specification Requirement</b>
Tensile Strength*	550,000 psi
Tensile Modulus*	33,000,000 psi
Ultimate Elongation*	1.50%

\* Verified by ASTM D3039 test procedure

Provide flexible, waterproofing, non-vapor-barrier protective top coating compatible with the CFRP per manufacturer's recommendations to protect the CFRP from ultraviolet radiation and mild abrasion. Match color and texture of protective top coating to adjacent concrete.

Complete CFRP systems, including CFRP and top coating, that are pre-approved under this specification are listed below:

**Table 2**  
**Approved CFRP Systems**

<b>Product Name</b>	<b>Producer</b>
SikaWrap Hex 117C	Sika Corporation
Tyfo SCH-11UP	Fyfe Corporation, LLC
Wabo Mbrace CF130	Watson Boman Acme Corporation

Substitutions for pre-approved systems that provide equivalent strengthening results are subject to approval by the Engineer.

- 3. Contractor Submittals.** Submit the following documentation, and obtain approval before work commences.
  - A. Contractor Training.** Provide certification from the CFRP manufacturer that the Contractor's project supervisor has completed a formal training program on the CFRP system selected, and provide documentation showing the Contractor has been certified or approved by the supplier of the CFRP system to install its product. Ensure that the

trained project supervisor remains at the work site at all times to instruct the work crew and direct the CFRP field installation work.

- B. Contractor Experience.** Provide documentation to demonstrate a minimum of 3 years experience in CFRP field installation, including successful completion of at least 4 CFRP field installation projects similar in scope and magnitude to the work proposed. Include contact person(s) and phone number(s) for each project. If the experience requirements cannot be met, ensure that a manufacturer's representative is on site before work begins and is available during the work at no additional cost to the Department. The Engineer may request the presence of the manufacturer's representative as needed.
- C. Material Supplier Training/Support Program (not required if pre-approved systems are used).** Provide documentation to show that the material supplier of the proposed carbon fiber reinforcing system has a formal training program technically supporting specialty contractors that includes a certification program. If the manufacturer does not have a formal training or certification program, ensure that a manufacturer's representative is on site before work begins and is available during the work at no additional cost to the Department. The Engineer may request the presence of the manufacturer's representative as needed.
- D. Product Data (not required if pre-approved systems are used).** Submit a schedule of repair materials to be used. Provide manufacturer's product data sheets that include: mechanical, physical, and chemical properties, and material specifications for the proposed primer, putty, resin, saturant, carbon fiber, and protective top coating; and standards, environmental durability, limitations, maintenance instructions, and general recommendations for the complete CFRP system. Provide testing information on the combination of the proposed carbon fiber reinforcement and epoxy when used together as a composite system. Provide manufacturer's Material Safety Data Sheets (MSDS) for all materials to be used on site and certification that the materials conform to local, state, and federal environmental and worker's safety laws and regulations.
- E. Shop Drawings (not required if pre-approved systems are used).** Provide shop drawings, signed and sealed by a Licensed Professional Engineer, including: repair locations; relevant dimensions of the system; details of the number, thickness, and orientation of carbon fiber layers proposed; locations of splices and corresponding lap lengths; and construction procedures specifying the individual steps in the installation process with time schedules each step. The construction procedures must clearly identify the environmental and substrate conditions that may affect the application and curing of the CFRP system. Include signed and sealed by a licensed professional Engineer calculations with the shop drawings indicating that the proposed system provides an equivalent strengthening result as that provided by the pre-approved systems.

#### **4. Construction Methods.**

- A. General.** As required, repair concrete substrate in accordance with Item 429, "Structure Concrete Repair." Obtain Engineer's approval of all concrete repairs and restoration prior to surface preparation. Conduct a pre-installation conference with the Engineer,

the contractor's project supervisor, the manufacturer's field representative, and other trades involved to discuss the work required for each application.

- B. Handling of Materials.** Deliver all CFRP components (excluding fabric) in original factory-sealed, unopened packaging clearly marked with the manufacturer's name, product identification (including brand, system identification number, and batch number), and expiration date or shelf life. Store and handle the products in accordance with the manufacturer's instructions. Do not use components that have exceeded their shelf life.
- C. Environmental Conditions.** Examine environmental conditions before and during installation of the CFRP system to ensure conformity with the contract requirements and manufacturer's recommendations. Do not install any CFRP component if the substrate surface is moist or wet, or if ambient or concrete surface temperatures are outside the 50-95° Fahrenheit temperature range, or if rainfall or condensation is anticipated.
- D. Surface Preparation.** Prepare concrete substrate surfaces to promote continuous intimate contact between the CFRP and the concrete by providing a clean, smooth, and flat or convex surface. Grind away all irregularities, unevenness, and sharp protrusions to provide less than 1/32-in. surface profile deviation. Fill all voids or depressions of diameters larger than 1/2 in. or depths greater than 1/8 in. Round or chamfer all inside and outside corners and sharp edges to a minimum radius of 1/2 in. Epoxy-inject all cracks in the concrete surface wider than 1/100 in. in accordance with Item 780, "Epoxy Injection." Remove all laitance, dust, dirt, oil, foreign particles, disintegrated materials, and any other matter that could interfere with the bond of the concrete to the CFRP using abrasive or water-blasting techniques. Allow all patching materials to cure a minimum of 2 days and reach a minimum of 3,000 psi compressive strength prior to installation of any CFRP components.
- E. Installation of CFRP System.** Use either the wet lay-up or the dry lay-up application method. Install the CFRP system in accordance with contract requirements and the manufacturer's recommendations. Obtain approval from Engineer prior to implementing any changes to the manufacturer's recommended CFRP installation procedure.
- F. Testing.** After the initial resin has cured at least 24 hours, perform the following tests: a visual inspection of the entire CFRP surface, an acoustic tap test of any areas suspected to contain air pockets, and at least 2 direct pull-off tests for each member strengthened in accordance with ASTM D4541 to verify the tensile bond between the concrete and the CFRP system. The Engineer will select areas within which to perform the direct pull-off test. At the discretion of the Engineer, perform some or all direct pull-off tests on CFRP test samples prepared at locations of similar substrate near the CFRP installation area. Prepare the test samples using identical application procedures at the same time that the project CFRP is installed. Repair the damaged CFRP and concrete at test areas after testing is completed.
- G. Repair of Defective Work.** Repair all defective work including voids, bubbles, delaminations, and fabric tears to provide a completed CFRP system with the designed



level of quality in accordance with the approved repair plan, the manufacturer's recommendations, and specific Engineer instructions. Obtain approval from the Engineer prior to performing any repairs. Make repairs to the satisfaction of the Engineer.

- 5. Measurement.** This Item will be measured by the square foot of area strengthened.

This is a plans quantity measurement Item. The quantity to be paid is the quantity shown in the proposal, unless modified by Article 9.2, "Plans Quantity Measurement." Additional measurements or calculations will be made if adjustments of quantities are required.

- 6. Payments.** The work performed and materials furnished in accordance with this Item and measured as provided under "Measurement" will be paid for at the unit price bid for "Carbon Fiber Reinforced Polymer Concrete Strengthening." This price is full compensation for all materials, labor, equipment, pull-off testing (including repair of test sites), manufacturer's supervision, and related services necessary to prepare the surface of the concrete, to install the CFRP system as detailed in the plans and specified herein, and to apply the topcoat. If an alternate CFRP system is used, this price includes all engineering, design, testing, technical services, and submittals.

When not shown on the plans as a separate pay item, payment for installing CFRP is subsidiary to the pertinent Items.